

What is claimed is:

1 1. An inflator bag (50) for a vehicle occupant restraining
2 apparatus being able to expand and develop by a high-pressure gas
3 filled in said inflator bag and is capable of restraining a vehicle
4 occupant by being expanded and developed, comprising:
5 a box-shaped bag main body (51) having gore portions (54)
6 on surrounding side faces to ensure its height, wherein, in each
7 of said gore portions (54), a folded line to be folded toward an
8 inside of said box-shaped bag main body (51) is formed in an
9 intermediate portion in a height direction of each of said gore
10 portions, which is used to allow each of said gore portions to
11 be folded, and wherein an overlaid and folded portion is formed
12 in an end of each of said gore portions (54a) on each of said
13 surrounding side faces with each corner portion of said box-shaped
14 bag main body (51) being sandwiched between one surrounding side
15 face and another surrounding side face adjacent to said one
16 surrounding side face wherein each of said gore portions is folded
17 in a overlaid manner in each of said overlaid and folded portions
18 at a same time when another gore portion (54b) on another
19 surrounding side face is folded and wherein said box-shaped bag
20 main body is folded in a manner so as to be in a flat state when
21 each of said gore portions is folded in a manner to form a valley
22 line along said folded line.

1 2. The inflator bag (50) for the vehicle occupant restraining
2 apparatus according to Claim 1, characterized in that said
3 box-shaped bag main body (51) is so constructed as to have a
4 hermetically sealed structure by blocking a bottom face of said
5 box-shaped bag main body (51) being opposite to a ceiling plate

6 (52) with a bottom plate (53).

1 3. The inflator bag (50) for the vehicle occupant restraining
2 apparatus according to Claim 1, characterized in that said
3 box-shaped bag main body (51) and said bottom plate are integrally
4 formed.

1 4. The inflator bag for the vehicle occupant restraining
2 apparatus according to Claim 1, characterized in that said
3 box-shaped bag main body (51) is made up of a resin sheet or a
4 metal sheet.

1 5. The inflator bag (500) for the vehicle occupant restraining
2 apparatus according to Claim 1, characterized in that said
3 box-shaped main body (501) having a rectangular cross-section
4 whose longitudinal side is smaller than its horizontal side is
5 so constructed that opening faces on both sides of a tube-shaped
6 body are blocked with end face plates and side face plates (502a)
7 serving as said longitudinal side of said tube-shaped body (502)
8 and said end face plates (502b) make up gore portions.

1 6. The inflator bag (500) for the vehicle occupant restraining
2 apparatus according to Claim 5, characterized in that said
3 tube-shaped body (502) is so constructed that plates making up
4 said tube-shaped body have unequal wall thicknesses wherein wall
5 thicknesses of its upper-face plate and its lower-face plate both
6 (502c) serving as horizontal sides of said tube-shaped body (502)
7 are large and wall thicknesses of its side face plates (502a)
8 serving as longitudinal sides are smaller than said wall
9 thicknesses of said upper-face plate and said lower-face plate

10 and wall thicknesses of said end face plates are equal to said
11 wall thicknesses of said side face plates.

1 7. An inflator bag (500) for a vehicle occupant restraining
2 apparatus being able to expand and develop by a high-pressure gas
3 filled in said inflator bag and is capable of restraining a vehicle
4 occupant by being expanded and developed, comprising:

5 a hollow body (201P) being opened at its both sides and
6 having a cross-sectional structure in which both sides of said
7 hollow body (201P) are dented in a U-shaped manner toward an inside
8 of a tube-shaped body (201) in one diameter direction out of two
9 diameter directions intersecting at right angles on said hollow
10 body and both sides of said hollow body are crushed in a manner
11 so as to be in a plane state in another diameter direction, and,
12 wherein a bag main body is formed by blocking opened portions of
13 said hollow body on both sides with end face plates and said bag
14 main body is crushed in a manner so as to be in a flat state on
15 both sides in said another diameter direction.

1 8. The inflator bag (500) for the vehicle occupant restraining
2 apparatus according to Claim 7, characterized in that, by denting,
3 in a U-shaped manner, portions on both sides of said tube-shaped
4 body (201) toward its inside portions in one diameter direction
5 out of two diameter directions intersecting at right angles on
6 said tube-shaped body (201) and, at a same time, by crushing
7 portions on both sides of said tube-shaped body in a manner so
8 as to be in a plane state in another diameter direction, a hollow
9 body (201P) being opened at both ends and having a cross-sectional
10 structure in which said tube-body is crushed and wherein a bag
11 main body is formed by blocking opened portions of said hollow

12 body with end face plates (202) using both sides (201c, 201d) on
13 which said hollow body is dented in an inside direction and said
14 end face plates as gore portions and; wherein said bag main body
15 is folded in a manner so as to be a flat state by further denting
16 portions on both sides (201c, 201d) having been dented toward an
17 inside direction of said hollow body and serving as said gore
18 portions and said end face plates (202) and, at a same time, by
19 further crushing portions on both sides in another diameter
20 direction.

1 9. The inflator bag (500) for the vehicle occupant restraining
2 apparatus according to Claim 7, characterized in that each of said
3 end face plates has a shrunk portion formed so as to be placed
4 in an inside of said hollow body and to develop at time when said
5 hollow body is filled with said high-pressure gas.

1 10. The inflator bag (50; 200; 500) for the vehicle occupant
2 restraining apparatus according to any one of Claim 1 to Claim
3 9, characterized in that said inflator bag is used for restraining
4 a hip portion of a vehicle occupant which is mounted in a front
5 lower portion of a seat cushion in a vehicle and expands and
6 develops by being filled with a high-pressure gas at time of sharp
7 reduction of speed of a vehicle to raise a front seat face of said
8 seat cushion which prevents a vehicle occupant being seated on
9 a seat from being moved forward.

1 11. The inflator bag (50; 200; 500) for the vehicle occupant
2 restraining apparatus according to any one of Claim 1 to Claim
3 9, characterized in that said inflator bag is used for restraining
4 a leg portion of a seated vehicle occupant which is placed in a

5 lower portion of an instrument panel of a vehicle and expands and
6 develops at time of being filled with a high-pressure gas at time
7 of sharp reduction of speed of a vehicle.

1 12. The inflator bag (50; 500) for a vehicle occupant
2 restraining apparatus according to Claim 1 to Claim 5,
3 characterized in that said box-shaped bag main body is an
4 angular-box shaped bag main body (51).

1 13. The inflator bag (50; 500) for the vehicle occupant
2 restraining apparatus according to Claim 1, characterized in that
3 said folded portion is a triangular folded portion.

1 14. The inflator bag (50; 500) for the vehicle occupant
2 restraining apparatus according to Claim 5 or Claim 6,
3 characterized in that said tube-shaped body (502) is angularly
4 tube-shaped.

1 15. The inflator bag for the vehicle occupant restraining
2 apparatus according to Claim 5 or Claim 6, characterized in that
3 said tube-shaped body (201) is circularly tube-shaped.

1 16. A method for manufacturing an inflator bag (500) for a
2 vehicle occupant restraining apparatus which is able to expand
3 and develop by being filled with a high-pressure gas and is capable
4 of restraining a vehicle occupant by being expanded and developed,
5 said method comprising:

6 a step of forming a tube-body (502) having an approximately
7 rectangular cross-section in which each of longitudinal sides is
8 smaller than each of horizontal sides by deforming a cross section

9 of a pipe cut so as to have a specified length;

10 a step of forming a folded line (505) along which each of
11 side face plates serving as each of said longitudinal sides of
12 said tube-shaped body is folded in a manner to form a valley line
13 toward an inside portion of said tube-shaped body in an
14 intermediate portion in its height direction;

15 a step of forming a folded line (505) along which each of
16 end face plates is folded in a manner to form a valley line toward
17 an inside portion of said tube-shaped body in an intermediate
18 portion in its height direction, which is used when opening faces
19 on both sides of said tube-body are blocked with said end face
20 plates;

21 a step of forming a box-shaped main body by blocking said
22 opening faces on both sides of said tube-shaped body with said
23 end face plates and by using side face plates serving as
24 longitudinal sides of said tube-shaped body and said end face
25 plates as gore portions;

26 a step of forming an overlaid and folded portion at an end
27 of each of said gore portions in a manner that each of corners
28 of said box-shaped body is sandwiched between one surrounding side
29 face and another surrounding side face adjacent to said one
30 surrounding side face and each of said gore portions is folded
31 in an overlaid manner in said overlaid and folded portion at a
32 same time when another gore portion on another surrounding side
33 face is folded; and

34 a step of obtaining an inflator bag (500) folded so as to
35 be in a flat state by folding, in a manner to form a valley line,
36 each of said gore portions made up of said side face plates and
37 end face plates along said folded line.

1 17. A method for manufacturing an inflator bag (500) for a
2 vehicle occupant restraining apparatus which is able to expand
3 and develop by being filled with a high-pressure gas and is capable
4 of restraining a vehicle occupant by being expanded and developed,
5 said method comprising:

6 a step of forming a tube-shaped body (201) being opened at
7 its both ends and having a cross-sectional structure in which both
8 side portions of a circular pipe cut so as to have a specified
9 length are dented toward its inside in one diameter direction out
10 of two diameter directions intersecting at right angles and both
11 side portions in another diameter direction are crushed so as to
12 be in a plane state; and

13 a step of obtaining a hermetically sealed-structured
14 inflator bag being folded so as to be in a flat state by crushing
15 both side portions of said tube-shaped body (201) in said another
16 diameter direction.

1 18. The method for manufacturing the inflator bag (500) for the
2 vehicle occupant restraining apparatus according to Claim 17,
3 characterized in that each of said end face plates has a shrunk
4 portion being placed at an inside of said hollow body and formed
5 so as to develop at time when said inflator bag (500) is filled
6 with said high-pressure gas.

1 19. The method for manufacturing the inflator bag (500) for the
2 vehicle occupant restraining apparatus according to Claim 17,
3 further comprising:

4 a step of forming said tube-shaped body (201) being opened
5 at its said both sides and having a cross-sectional structure in
6 which a circular shape is crushed by denting both side portions

7 of a circular pipe cut so as to have a specified length toward
8 its inside in one diameter direction out of two diameter
9 directions intersecting at right angles and by crushing both side
10 portions in another diameter direction so as to be in a plane state;

11 a step of forming a bag main body having both side portions
12 dent toward an inside of said tube-shaped body and said end face
13 plates used as gore portions by blocking opened portions on both
14 sides of said tube-shaped body (201) with said end face plates;
15 and

16 a step of further denting, when said bag main body is folded
17 so as to be in a flat state, both side portions dent toward an
18 inside of said tube-shaped body serving as said gore portions and
19 said end face plates serving as said gore portions toward said
20 inside of said tube-shaped body and, at a same time, further
21 crushing said both side portions in another diameter direction
22 so as to be in a flat state.

1 20. The method for manufacturing the inflator bag (500) for the
2 vehicle occupant restraining apparatus according to Claim 16,
3 characterized in that said folded portions are triangular folded
4 portions.

1 21. The method for manufacturing the inflator bag (500) for the
2 vehicle occupant restraining apparatus according to Claim 16,
3 characterized in that said tube-shaped body is an angular
4 tube-shaped body.

1 22. The method for manufacturing the inflator bag (200; 500)
2 for the vehicle occupant restraining apparatus according to Claim
3 16 or Claim 17, characterized in that said pipe is a circular pipe.

1 23. The method for manufacturing the inflator bag (200; 500)
2 for a vehicle occupant apparatus according to Claim 16 or Claim
3 17, characterized in that said inflator bag (200; 500) has a
4 hermetically sealed structure.